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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/789,800	02/27/2004	Kevin Torek	303.871US1	5647
21186	7590	04/19/2006	EXAMINER	
SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.			HO, TU TU V	
P.O. BOX 2938			ART UNIT	
MINNEAPOLIS, MN 55402			PAPER NUMBER	
			2818	

DATE MAILED: 04/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/789,800

Applicant(s)

TOREK ET AL.

Examiner

Tu-Tu Ho

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 January 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 4-45 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 4-45 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

1. Applicant's Amendment filed 01/25/2006 has been reviewed and placed of record in the file.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. **Claims 1-2 and 4-37** are rejected under 35 U.S.C. §103(a) as being unpatentable over Shin et al. U.S. Patent 6,385,020 (the '020 reference, cited in a previous office action) in view of Verhaverbeke et al. U.S. Patent 5,922,624 (cited in a previous office action).

Referring to **claims 1-2, 4-16, 18-21, and 23-37**, the '020 reference discloses in Figs. 16A-16B and respective portions of the specification a memory device and an inherent method of fabricating thereof comprising providing a semiconductor substrate (not shown, column 5, lines 60-65) that includes a memory container (generally defined by 120/130/140'/150) having a double-sided capacitor (generally defined by conductor/insulator/conductor 135/139/150 – Fig. 16A, that eventually becomes 137/142/151), which is functionally the same as the memory container having a double-sided capacitor of claim 1, functionally the same as the double-sided capacitor container of claims 7, 11, and 16, functionally the same as the memory container with a sidewall with an embedded capacitor of claim 21, functionally the same as the memory container whose side wall includes a double-sided capacitor of claim 26, and functionally the same as the double-sided container on a semiconductor substrate of claim 31; and etching a layer (130), that could be an oxide layer or a borophosphosilicate glass (BPSG) material (column 6, lines 15-30), the layer adjacent to the sidewall of the memory

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container, which is also the sidewall of the double-sided capacitor, or adjacent to the double-sided container.

However, the '020 reference fails to teach that the etching is a vapor phase etching as claimed. The reference thus further fails to teach that the vapor phase etching includes a vapor that includes hydrogen fluorine (HF), an alcohol, a methanol, and specially carboxylic that could function as a surface tension lowering agent (claim 1) or as an etch initiator (claims 6, 11).

Verhaverbeke, in disclosing a method for semiconductor processing, teaches that a vapor phase etching including a vapor that includes hydrogen fluorine (HF), an alcohol, a methanol, and specially carboxylic - that could function as a surface tension lowering agent or as an etch initiator as claimed, yields a much more uniform and reproducible product (columns 2-6, particularly column 2, lines 36-43, column 5, lines 16-18, and Tables 1-5, more particularly column 5, lines 16-18 and 55-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the reference's semiconductor memory device using a vapor phase etching as claimed. One would have been motivated to utilize such a vapor phase etching including a vapor that includes hydrogen fluorine (HF), an alcohol, a methanol, and specially carboxylic - that could function as a surface tension lowering agent or as an etch initiator - in view of the teachings in Verhaverbeke that such a vapor phase etching yields a much more uniform and reproducible product.

Referring to **claims 17 and 22**, Verhaverbeke further teaches heating the etching material as claimed (column 5, last paragraph).

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3. **Claims 38-45** are rejected under 35 U.S.C. §103(a) as being unpatentable over Shin et al. U.S. Patent 6,385,020 (the '020 reference) in view of Yang et al. U.S. Patent 6,727,155.

Referring to **claims 38 and 41-42**, the '020 reference discloses in Figs. 16A-16B and respective portions of the specification a memory device and an inherent method of fabricating thereof substantially as claimed and as detailed above for claims 1-37, including etching or removing the insulating layer (130, that could be BPSG or an oxide) but fails to disclose that the etching is a vapor wet etching operation.

Yang, in disclosing a method for forming a semiconductor device, teaches that a vapor wet etching is superior than a conventional etching in that the vapor wet etching prevents damages from occurring to the adjacent material layer, which is the source/drain regions in the Yang case (Yang, column 4, lines 23-26) and which would be the layer 135/120/100/semiconductor substrate in the '020 reference case (the '020 reference, Fig. 16A).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the '020 reference's semiconductor device using a vapor wet etching. One would have been motivated to utilize such a vapor wet etching in view of the teachings in Yang that such a vapor wet etching prevents damages from occurring to an adjacent material layer.

Referring to **claims 39-40 and 43-45**, although both the '020 reference and Yang are quiet about the etching materials as claimed, the materials as claimed were known and available to one of ordinary skill in the art at the time the invention was made, for example, disclosed by Verhaverbeke as detailed above, therefore selection of such materials would have been obvious. And such materials, namely a material that includes hydrogen fluorine (HF), an alcohol, a

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methanol, and specially carboxylic - that could function as a surface tension lowering agent or as an etch initiator.

Response to Arguments

4. Applicant's arguments with respect to amended claims 1-2 and 4-45, filed 01/25/2006, have been fully considered but they are not persuasive.

With respect to Applicant's arguments on pages 15-17 of the Remarks that Verhaverbeke's acetic acid only serves as catalyst (Verhaverbeke, col. 4, line 34) and not as a surface tension lowering agent or as an etch initiator, it is pointed out that there is no proof that Verhaverbeke's acetic acid only serves as catalyst. In the same column, column 4, beginning on line 10, Verhaverbeke discloses that "[A]nhydrous HF hardly etches silicon oxide at room temperature. A catalyst is necessary to start the reaction", effectively teaching that the catalyst, which is an alcohol, a methanol, an acetic acid, and specially carboxylic, is an element of the vapor phase etchant, meeting the claimed limitation "a vapor including an agent" (see definition of "include", cited below or next page), and since the disclosed material, an alcohol, a methanol, an acetic acid, and specially carboxylic, is the same as the claimed material (for example, claims 2 and 8), the disclosed agent, an alcohol, a methanol, an acetic acid, and specially carboxylic, could function as a surface tension lowering agent and could be termed a surface tension lowering agent as claimed.

in•clued




pronunciation
tr.v. includ•ed, includ•ing, includes.

1. To take in as a part, element, or member.
2. To contain as a secondary or subordinate element.

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3. To consider with or place into a group, class, or total: *thanked the host for including us.*
[Middle English *includen*, from Latin *includere*, to enclose, *in-*, in. See *in-*². *cludere*, to close.]
- *includ-a-ble* or *includ-i-ble*

The American Heritage Dictionary of the English Language, © Houghton Mifflin Company 2003 

Furthermore, Verhaverbeke discloses in “Example”, col. 5, last paragraph, a reaction chamber equipped with three inlets, one for HF, another for acetic acid. Comparing this setup with the present invention (present invention, Fig. 1), one can hardly see a substantial difference, as far as HF source and surface tension lowering agent (acetic acid) are concerned.

Furthermore, by Applicant’s own admission, the surface tension lowering agent (an alcohol, a methanol, an acetic acid, and specially carboxylic) is approximately 10% of the mixed vapor, approximately 30% of the mixed vapor, or may be a greater or lesser percentage of the mixed vapor (present invention, page 10, lines 19-26). As such, Verhaverbeke’s additive element or agent, an alcohol, a methanol, an acetic acid, and specially carboxylic, is fairly termed a surface tension lowering agent.

Finally, it is appreciated that in one specific embodiment, Applicant discloses that “the surface tension lowering agent source 106 is coupled to directly input the surface tension lowering agent directly into the vapor etch chamber 104, while the HF source 108 and the etch initiator source 110 are coupled to the mix unit 112 to allow for premixing of the HF with the etch initiator composition” (present invention, page 11, line 6), thus clearly teaching a process that is not seen in the Verhaverbeke’s reference. However, these limitations are not in the claims.

Conclusion

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5. **THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).**

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tu-Tu Ho whose telephone number is (571) 272-1778. The examiner can normally be reached on 7:30 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, DAVID NELMS can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Tu-Tu Ho
April 14, 2006